

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claims 1-41 (Canceled)

42. (Original) A method of operating an internal combustion engine, the method comprising the steps of:
- lightly compressing a low pressure air charge outside a cylinder;
 - directing the low pressure air charge through a first intake port into a cylinder cooperating with a piston, during an intake stroke of the piston;
 - compressing a high pressure air charge outside of the cylinder; and,
 - directing the high pressure air charge through a second intake port into the cylinder, during a compression stroke of the piston.
43. (Original) The method of claim 42, wherein the low pressure air charge is at a first pressure and the high pressure air charge is at a second pressure, the second pressure being greater than the first pressure.
44. (Original) The method of claim 42, wherein the low pressure air charge is compressed by a first compressor and the high pressure air charge is compressed by a second compressor.
45. (Original) The method of claim 42, wherein a first intake valve selectively occludes the first intake port and a second intake valve selectively occludes the second intake port, the second intake valve occupying an open position only while the first intake valve occupies a closed position.

46. (Original) The method of claim 45, further comprising the steps of:
controlling operation of a compressor generating the high pressure air charge and the first and the second intake valves; and,
controlling one or more air charge characteristics selected from the group consisting of turbulence, density, pressure, temperature, mean pressure and peak pressure.
47. (Original) The method of claim 42, wherein a first intake valve cooperates with the first intake port and a second intake valve cooperates with the second intake port, the second intake valve occupying an open position only during the compression stroke.
48. (Original) The method of claim 47, further comprising the steps of:
controlling operation of a compressor generating the high pressure air charge and the first and the second intake valves; and,
controlling one or more air charge characteristics selected from the group consisting of turbulence, density, pressure, temperature, mean pressure and peak pressure.
49. (Original) The method of claim 42, further comprising the step of:
cooling the low pressure air charge prior to entry thereof into the cylinder.
50. (Original) The method of claim 42, further comprising the step of:
cooling the high pressure air charge prior to entry thereof into the cylinder.
51. (Canceled)
52. (Original) The method of claim 74, wherein the primary air charge is at a first pressure and the secondary air charge is at a second pressure, the second pressure being greater than the first pressure.

53. (Original) The method of claim 74, wherein the directing of the primary air charge into the cylinder is completed before the introducing of the secondary air charge into the cylinder.
54. (Original) The method of claim 74, wherein a first intake valve selectively occludes the first intake port and a second intake valve selectively occludes the second intake port, the first intake valve occupying an open position only while the second intake valve occupies a closed position.
55. (Original) The method of claim 54, further comprising the steps of:
controlling operation of a compressor generating the secondary air charge and the first and the second intake valves; and,
controlling one or more air charge characteristics selected from the group consisting of turbulence, density, pressure, temperature, mean pressure and peak pressure.
56. (Original) The method of claim 74, wherein a first intake valve cooperates with the first intake port and a second intake valve cooperates with the second intake port, the second intake valve occupying an open position only during the compression stroke.
57. (Original) The method of claim 56, further comprising the steps of:
controlling operation of a compressor generating the secondary air charge and the first and the second intake valves; and,
controlling one or more air charge characteristics selected from the group consisting of turbulence, density, pressure, temperature, mean pressure and peak pressure.
58. (Canceled)
59. (Original) The method of claim 74, further comprising the step of:
cooling the primary air charge prior to entry thereof into the cylinder.

60. (Original) The method of claim 74, further comprising the step of:
cooling the secondary air charge prior to entry thereof into the cylinder.

Claims 61-73 (Canceled)

74. (Previously Presented) A method for operating an internal combustion engine, the method comprising the steps of:
directing a primary air charge through a first inlet port into a cylinder;
compressing a secondary air charge outside of the cylinder;
introducing the secondary air charge through a second inlet port of the cylinder,
after compression has begun within the cylinder; and
lightly compressing the primary air charge prior to directing thereof into the cylinder.

Claims 75-88 (Canceled)

89. (Previously Presented) A method for operating an internal combustion engine, the method comprising the steps of:
directing air through a first intake port to a cylinder during an intake stroke of a piston cooperating with the cylinder;
directing compressed air through a second intake port to the cylinder only during a compression stroke of the piston;
controlling the time of operation of a compressor generating the compressed air and the timing of intake valves cooperating with the first and the second intake ports; and,
controlling one or more air charge characteristics selected from the group consisting of turbulence, density, pressure, temperature, mean pressure and peak pressure.

90. (Previously Presented) A method of operating an internal combustion engine, the method comprising the steps of:

introducing air through a first intake port into a cylinder during an intake stroke of a piston cooperating with the cylinder;
introducing compressed air through a second intake port into the cylinder during a compression stroke of the piston.;
controlling the time of operation of a compressor generating the compressed air and the timing of the first and the second intake valves; and,
controlling one or more air charge characteristics selected from the group consisting of turbulence, density, pressure, temperature, mean pressure and peak pressure.

91. (Previously Presented) A method of operating an internal combustion engine, the method comprising the steps of:

introducing air through a first intake port into a cylinder during an intake stroke of a piston cooperating with the cylinder;
introducing compressed air through a second intake port into the cylinder during a compression stroke of the piston.;
controlling the time of operation of a compressor generating the compressed air and the timing of the first and the second intake valves; and,
controlling one or more air charge characteristics selected from the group consisting of turbulence, density, pressure, temperature, mean pressure and peak pressure.

92. (Previously Presented) A method of operating an internal combustion engine, the method comprising the steps of:
- directing air through a first intake port into a cylinder during an intake stroke of a piston cooperating with the cylinder;
 - increasing the air charge density and turbulence in the engine, including the step of directing compressed air through a second intake port into the cylinder during a compression stroke of the piston;
 - controlling the time of operation of a compressor generating the compressed air and the timing of intake valves cooperating with the first and the second intake ports; and,
 - controlling one or more air charge characteristics selected from the group consisting of turbulence, density, pressure, temperature, mean pressure and peak pressure.
93. (Previously Presented) A method of operating an internal combustion engine having a crankshaft driven by at least one piston moving through a plurality of power cycles, each power cycle involving at least a compression stroke and an expansion stroke aided by combustion taking place within a cylinder, wherein the compression stroke results in compressing of air and fuel within the cylinder, said method comprising the steps of
- introducing during each power cycle air through a first port into a cylinder;
 - introducing during each power cycle a compressed air charge through a second port into the cylinder;
 - wherein a first intake valve cooperates with the first port and a second intake valve cooperates with the second port, the second intake valve occupying an open position only while the first intake valve occupies a closed position;
 - controlling the time of operation of a compressor generating the compressed air and the timing of the first and the second intake valves; and,

controlling one or more air charge characteristics selected from the group consisting of turbulence, density, pressure, temperature, mean pressure and peak pressure.

94. (Previously Presented) A method of operating an internal combustion engine having a crankshaft driven by at least one piston moving through a plurality of power cycles, each power cycle involving at least a compression stroke and an expansion stroke aided by combustion taking place within a cylinder, wherein the compression stroke results in compressing of air and fuel within the cylinder, said method comprising the steps of
- introducing during each power cycle air through a first port into a cylinder;
 - introducing during each power cycle a compressed air charge through a second port into the cylinder;
 - wherein a first intake valve cooperates with the first port and a second intake valve cooperates with the second port, the second intake valve occupying an open position only during the compression stroke;
 - controlling the time of operation of a compressor generating the compressed air and the timing of the first and the second intake valves; and,
 - controlling one or more air charge characteristics selected from the group consisting of turbulence, density, pressure, temperature, mean pressure and peak pressure.
95. (Previously Presented) The method of claim 89, 90, 91, 92, 93 or 94, comprising the step of producing a super-charged air density and increasing turbulence in a low compression engine.
96. (Previously Presented) The method of claim 89, 90, 91, 92, 93 or 94, wherein compressed air is introduced through a second port into the cylinder after compression has begun.

97. (Previously Presented) The method of claim 93 or 94, wherein the step of introducing during each power cycle a compressed air charge through a second port into the cylinder, includes the step of varying the compressed air charge introduced in one cycle of the plurality of power cycles from the compressed air charge introduced during another of the cycles of the plurality of power cycles.
98. (Previously Presented) A method of operating an internal combustion engine, the method comprising the steps of:
- lightly compressing a low pressure air charge outside a cylinder;
 - directing the low pressure air charge into a cylinder cooperating with a piston, during an intake stroke of the piston;
 - compressing a high pressure air charge outside of the cylinder;
 - ceasing the step of directing the low pressure air charge; and,
 - directing the high pressure air charge into the cylinder, after the ceasing step and during a compression stroke of the piston.
99. (Previously Presented) The method of claim 98, wherein the low pressure air charge is at a first pressure and the high pressure air charge is at a second pressure, the second pressure being greater than the first pressure.
100. (Previously Presented) The method of claim 98, wherein the low pressure air charge is compressed by a first compressor and the high pressure air charge is compressed by a second compressor.
101. (Previously Presented) The method of Claim 98, wherein the low pressure air charge is directed into the cylinder through a first intake port and the high pressure air charge is directed into the cylinder through a second intake port different from the first intake port.

102. (Previously Presented) The method of claim 101, wherein a first intake valve selectively occludes the first intake port and a second intake valve selectively occludes the second intake port, the second intake valve occupying an open position only while the first intake valve occupies a closed position.
103. (Previously Presented) The method of claim 102, further comprising the steps of:
controlling the time of operation of a compressor generating the high pressure air charge and the timing of the first and the second intake valves; and,
controlling one or more air charge characteristics selected from the group consisting of turbulence, density, pressure, temperature, mean pressure and peak pressure.
104. (Previously Presented) The method of claim 101, wherein a first intake valve cooperates with the first intake port and a second intake valve cooperates with the second intake port, the second intake valve occupying an open position only during the compression stroke.
105. (Previously Presented) The method of claim 104, further comprising the steps of:
controlling the time of operation of a compressor generating the high pressure air charge and the timing of the first and the second intake valves; and,
controlling one or more air charge characteristics selected from the group consisting of turbulence, density, pressure, temperature, mean pressure and peak pressure.
106. (Previously Presented) The method of claim 98, further comprising the step of:
cooling the low pressure air charge prior to entry thereof into the cylinder.
107. (Previously Presented) The method of claim 98, further comprising the step of:
cooling the high pressure air charge prior to entry thereof into the cylinder.
108. (Canceled)

109. (Canceled)

110. (Currently Amended) ~~The method of Claim 109,~~ A method of operating an internal combustion engine, the method comprising the steps of:

directing a first air charge component into a cylinder of the engine;

increasing the air charge density and turbulence in the engine, including the step

of directing a second air charge component into the cylinder;

controlling the timing of the step of directing a second air charge component;

controlling one or more air charge characteristics selected from the group

consisting of turbulence, density, pressure, temperature, mean pressure and

peak pressure;

compressing the second air charge component prior to introduction to the

chamber; and

~~further comprising the step of~~ compressing the first air charge component prior to introduction into the chamber.

111. (Previously Presented) The method of Claim 110, wherein the second air charge component is more highly compressed than the first air charge component.

112. (Canceled)

113. (Canceled)

114. (Canceled)

115. (Canceled)